MUSEUM ALLIANCE

QUARTERLY

LOS ANGELES COUNTY MUSEUM OF NATURAL HISTORY
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The Huichols are people of the Peyote, the psychoactive cactus plant, which grows in the North-Central deserts of Mexico. Ramón, Huichol artist, uses the combination of beeswax and colored wool to depict the sacred lore of the Huichols . . . visualizing a ceremony or tradition, illuminating the Peyote cult.□□□

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The Quest for the Fourteen Toed Horse

by **J. R. Macdonald**
Senior Curator
of Vertebrate Paleontology

Old legends never die, they just get stronger and stronger until fancy becomes fact. Picture a fossil quarry somewhere in the deserts or steppes of the West. A Paleontologist is digging bones of ancient horses. A visitor approaches—cowboy, Indian, or even dude:

"What are you digging?"

"Fossil horses."

"Oh, five toed horses."

No, three toed horses."

"Humph!"

Cowboy, Indian or dude gets a superior look and wanders off, because everybody knows that fossil horses were the size of fox terriers and had five toes.

Somewhere long ago, it was stated by someone who probably should have known better that the earliest horses had five toes. Since that time, everybody who has ever heard or thought about ancient horses just knows that the first ones had five toes.

Evolution is a continuing thing. The classification distinctions we make between living organisms are fictions and useful conventions when we consider Time as a function of relationship. When in the Early Eocene or possibly the very Late Paleocene (the first two epochs of the "Age of Mammals") we recognize a group of animals which are designated as the first horses—eohippus to the layman, **Hyracotherium** to the Paleontologist—they have four toes on the front feet and three toes on the hind feet. There just aren't any five toed horses. Four plus four plus three plus three equals fourteen, and no matter how you manipulate it you can't get five.

We are doing a phylogeny (or family tree) of the horse family for the Hildegarde Howard Cenozoic Hall. We do have a mounted skeleton of an eohippus, but it is a composite of several individuals and plaster. Hoping to find a better one, we headed out to eohippus country in the summer of 1968.

In June, 1967, while on the way to Montana for the dinosaur diggings, we stopped by Worland, Wyoming, at the invitation of Dr. Edward Horsley. Dr. Horsley and a group of local citizens were boosting Worland as the eohippus capital of the world. Part of their promotion was the distribution of bumper stickers reading, "Home of the original horse — EOHIPPUS — Worland, Wyoming." I talked to this group and wrote a series of articles on the history of the horse for the local paper, **The Northern Wyoming Daily News.** The upshot of this was an invitation to come and work the badlands of the Big Horn Basin in the Worland area.

Field funds were obtained from a generous donor, permits were secured from the State of Wyoming and the Bureau of Land Management, and the search was on for the month of July, 1968. Field hands included the writer, Douglas Macdonald and John Chadwick each for two

weeks, and Father Floyd Jenkins, S. J. of Loyola University of Los Angeles for three weeks. After years of working in the fabulous White River Badlands and the Sharps Formation of South Dakota, I was badly spoiled. Good fossils in the early Eocene Willwood Formation of the Big Horn Basin are relatively scarce. When you work all day and only find two or three "savers" you get a little discouraged. We kept looking for our fourteen toed horse. Pieces of jaws, parts of skulls and even some foot material turned up from time to time. The newspapers reported that the students from the Iowa State University summer field camp had found an eohippus skeleton in another part of the Basin. We were green with envy. Then we talked to some of the party and learned that a partial skull and some miscellaneous bones had grown, in a reporter's mind, into a complete skeleton. Some of the local citizens were outraged over such wonderful specimens being hauled off to other states. Douglas and I were interviewed for the paper. We told them how much it costs to collect, prepare and mount skeletons for exhibit and pointed out that small museums just can't afford such luxuries unless than can get outside support just as we do. This outraged another segment of the population because they thought we were casting aspersions on the relative poverty of Wyoming. This in spite of the fact that I had prefaced this particular remark with the fact that I had formerly been a Curator of Vertebrate Paleontology at the Museum of Geology of the South Dakota School of Mines and Technology—a state institution with exactly the same financial problems as those in Wyoming. The gratifying thing about the whole incident was that the reporter had done an excellent job of writing the interview.

We didn't find our horse skeleton, but we did get other things of interest for

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Plant Inebriants

by Dr. William A. Emboden, Jr.
Associate Professor of Biology,
San Fernando Valley State College,
and Museum Associate in Botany,
Los Angeles County Museum
of Natural History

Wine making. A hand colored woodcut from a German calendar of 1490 (Augsburg Teutcher Kalender) used to represent the fall season.

"I drink wine, not for Pleasure, nor for Profligacy, nor to renege Religion and good Morals; but solely to escape a Moment from myself."

The Rubaiyat of Umar Khaiyam, Quatrain 63. Translated from the French of B. Nicholas by Frederick Baron Corvo.

Out of ancient Persia comes a wondrous legend of a prince who owned a vineyard which provided table grapes and grape juice which he stored for a time in the skin of sheep. One year when the harvest was particularly bountiful, the prince was able to put aside numerous skins of this delicious juice which he hoped to consume during the period between harvests. After several weeks he found that much of the juice had become sour so he had these skins labeled as poison. This same prince had a wife who could not satisfy him in love, and so despondent was the lady that coming upon these skins labeled poison, she consumed cup upon cup of the brew to put an end to her wretched life. To her amazement, the result was not a visitation by the angel of death, but a wonderful sense of joy and buoyancy. She rushed to her husband to reveal this mysterious event and her gaiety and charm left them both fulfilled. From that time forward the brew was celebrated throughout the land as a font of happiness.

Where true origins must remain a mystery, a legend is perhaps the best beginning, and this story from Persia is among the numerous colorful myths which have been told to explain the origins of alcohol among the civilizations of man. There is no doubt that the production of alcohol predates any appearance of man on our planet, for alcohol is the product of certain classes of single celled organisms splitting sugar molecules into the products of carbon dioxide and alcohol. Fermentation, as this process has been called, occurs whenever sugar and yeast are found together in an aqueous environment. Flowers, fruits, stems, leaves, roots, all plant parts which contain sugar or starches are susceptible to this enzymatic breakdown by living organisms. We have hieroglyphics as well as drawings from ancient Egypt which show the fermentation of grain being carried out to produce alcohol. Among the early Hebrew sects, the fruit of the vine became the most popular source of alcohol and the practice spread to the Arabs and Coptic Christians, the latter regarding fermentation as an act of the devil. The bible mentions wine 165 times. In merry England of the sixteenth century we find flowers of the dandelion **(Taraxacum officinale)** being gathered and the nectar therein fermented to a fine golden colored wine. At the same time the Moors were enjoying date wine **(Phoenix dactylifera),** the Japanese rice wine, the Incas **Chicha** from chewed corn **(Zea mays)** and the Mexicans **Pulque** from the macerated stem and leaf bases of **Agave** species. As bees brought nectar converted to honey to their hives, the Vikings of old were busy diluting and fermenting the honey to produce mead which they drank from human skulls with the toast, "skoal." Imagine how changed Russian history might be without the traditional vodka, which in Russia is made from fermented potato tubers **(Solanum tuberosum)** or from wheat. No flower or fruit escapes the scrutiny of man in his quest for inebriants. But should you believe the intervention of man necessary in this process, you will have all suspicions allayed upon witnessing cattle feeding below apple trees which have dropped their fruit. As the apples decompose, alcohol is produced. Few sights are as comical as a herd of drunken cattle.

In the minds of most occidental men Hellenic civilization is the zenith of western culture and from it was derived most of what was glorious in the subsequent Roman Empire. It was the Hellenic God Dionysus who evolved from god of vegetation to god of the vine and only at that point was he admitted to the sacred Mount Olympus. In the excesses of the subsequent Roman Empire Dionysus became Bacchus, a symbol of indulgence and the god who reigned at the drunken bacchanalia. Bacchus was the constant companion of Silenus, his fat and jolly old teacher who, significantly, had the power to prophesy when drunk. If we consider the twenty-five million gallons of wine consumed per year in the heyday of Rome to be a historical imprudence we need only to consider that in the United States today, more money is spent on alcoholic beverages than is spent on education at all levels of hospitalization of the sick, on alleviating poverty, and the spending on alcohol is exceeded only by the expenditure on war. We must proceed with caution in our condemnation of these earlier civilizations.

It is a common assumption that alcohol is a stimulant; such is not the case, for alcohol is a protoplasmic poison acting as a primary and continuous depressant of the central nervous system; furthermore, it is in some instances addictive. It is not the function of this paper to deal with alcohol as a disease of man, but suffice it to say that great numbers of people in the United States are suffering from alcoholism, a condition which wastes their lives. Taken in moderation, alcohol may serve as a mild euphoriant by suppressing what Freud refers to as the "Super-ego." Properly considered a food, alcohol does supply calories as a breakdown product of sugar. When used as a substitute for a normal diet, the individual has a real problem. The effect of alcohol as a protoplasmic poison is conspicuous in the production of alcoholic beverages, for when the concentration of alcohol reaches 13.0% it becomes toxic to the organism bringing about the breakdown and the process of fermentation ceases. Thus concentrations of alcohol above this level in alcoholic beverages are introduced. The most serious effect of alcohol on the human body in long terms is its interference with normal fat metabolism, especially in the liver where the accumulation of fat causes the organ to become hard and swollen (cirrhosis).

Another of the myths surrounding alcoholic beverages is that they have aphrodisiac properties. Jests regarding alcohol are too numerous in Shakespeare to quote, but one seems particularly apt. In Macbeth (Act II, Scene 1) Macduff asks a Porter, "What three things does drink especially provoke?". The porter answers, "Merry, sir, nose-painting, sleep, and urine. Lechery, sir, it provokes and it unprovokes; it provokes the desire, but it takes away the performance: therefore, much drink may be said to be an equivocator with lechery; it makes him and it mars him; it sets him on, and it takes him off; it persuades him and disheartens him;

Inflorescence (flower cluster) of the North American grape, **Vitis labruscula.**

Mature fruit of the European wine grape **Vitis vinifera.**

makes him stand to, and not stand to: in conclusion, equivocates him in a sleep, and giving him the lie, leaves him." There is both humor and real understanding of the effects of alcohol in the observations of this 16th century bard.

In primitive cultures, the making of alcoholic beverages from grain has changed little from the procedures which Columbus observed when on his third voyage in 1498 he found the Indians of the area which is now Venezuela making a crude, but tasty, beer called **Chicha.** Women of the Indian village chew kernels of corn into a pulp which they spit into a common vessel. Unwittingly, they are breaking down the starchy kernels by enzymes in their saliva (salivary amalyases and maltases) to simpler molecules of sugar which can be acted upon by yeast. Yeast cannot break down starch molecules and only certain sugars are to its liking. There is no need to add yeast to the pot of mash and spittle, for these microscopic organisms are to be found almost everywhere. Being a fungus, a warm moist environment such as the spittle pot of corn pulp which has started to change to a sugary brew, is an ideal environment in which to proliferate. As the fungus reproduces asexually at a considerable rate, it utilizes the sugars to provide energy for its metabolism giving off ethyl alcohol and carbon dioxide as a by-product. When the alcohol concentration reaches 13 percent, the yeast succumbs to the poison which it has created. No organism can survive if it continues to accumulate poisons in its environment, a lesson man has yet to learn.

Although it seems likely that alcohol from grain was man's first adventure into **inebriantia,** the procedure of making wine from fruit has a considerable history also. Excavations in ancient Egypt have revealed a winery which has been dated as 3700 B.C. In the case of wine making the tedious process of chewing is unnecessary, for the grapes store considerable amounts of sugar which are fermented by yeast which accumulates on the skin of the grapes.

While our wines of today are produced with an almost infallible skill that assures a consistent quality never experienced by any past generations, it is estimated that over half of the wine produced by the Egyptians and Romans spoiled because of exposure to air and organisms which can convert the beverage into vinegar. This was overcome by the Greeks who learned to stop the bottles with resin or pine pitch: A process which insured against spoilage but usually flavored the wine to a considerable degree. Greece has, however, developed a taste for resinous wines and while such procedures are no longer necessary, a bit of pitch is sometimes introduced to flavor the wine.

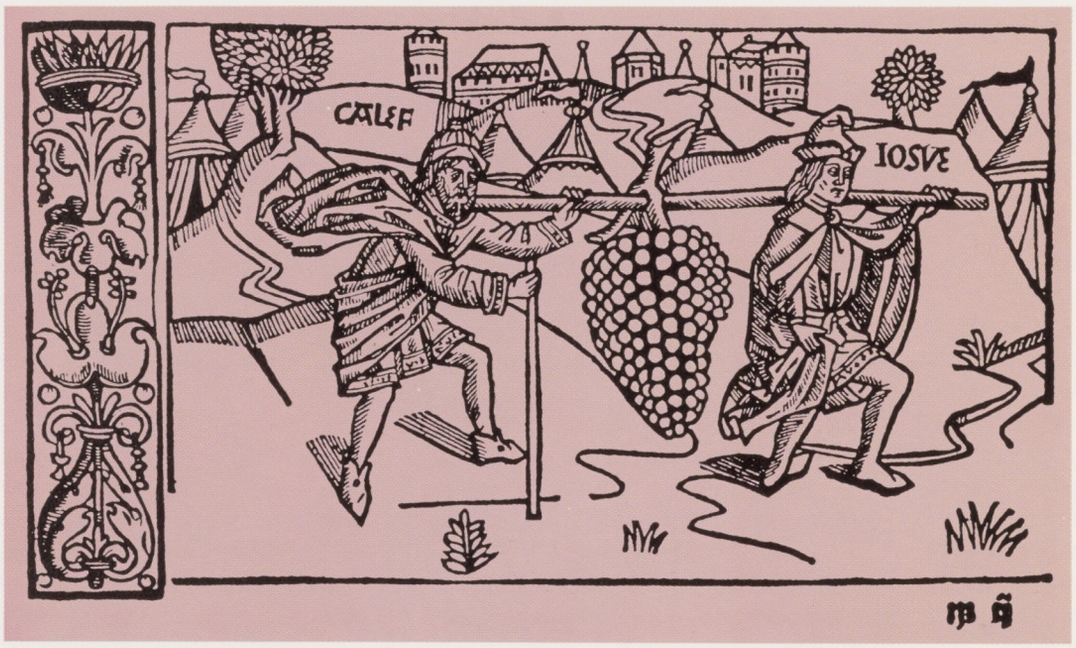
Another tale which surrounds spirit production is that of the Benedictine monk Dom Perignon, Cellarer at The Abby of Hautvillers, who, when assisting in the production of sacramental wine, in 1679 stoppered some bottles of wine before fermentation had gone to completion thus causing the bubbles of carbon dioxide to accumulate. This fortunate mistake is said to have been the origin of champagne. For the best champagne and sparkling burgundy is still produced by a premature sealing of the bottle of fermenting grape juice; poorer substitutes are produced by artificially introducing bubbles of carbon dioxide. The art and science of wine making has reached such levels of complexity that some of our universities now offer programs leading to degrees in this area. Enology, the study of wine production is not to be confused with viticulture, the study of producing grapes; granted, they are complementary disciplines.

Californians should be especially concerned with the production of alcoholic beverages, for it is one of the most important aspects of the state's economy. Grape production is the most brilliant facet of our agriculture, and most of these grapes will be made into wine—over one thousand grapes go into each fifth of wine. By the year 1867, California was not only supplying most of the nation, including the president's table, with wines, but was also exporting wine to England, Denmark, Germany, Canada, and South America, the annual vintage then being over four million gallons.

In the mid 18th century in Jamestown, the city fathers offered a monetary reward to any colonist who could make a potable wine from the fruit of grape cuttings which were brought from Europe. After almost a century and futile attempts in all of the colonies, John Dufour accidentally began cultivating the native grape **(Vitis labruscula)** believing it to be a European vine. In subsequent years native vines were cross bred and selected for their utility in wine production. Many of the vines of our eastern states are from derivatives of these vines; among them the Delaware, Concord, and Catawba wines are notable.

California leads the states in wine production both in variety and quantity of wines produced. (Californians would be quick to add quality to this list). In 1769 the mission fathers at Mission San Diego had established a vineyard and the subsequent proliferation of vineyards parallels the spread of the Catholic Church in the state. However, commercial production of wine in the west was instituted in Los Angeles in 1824 by Joseph Chapman, one of the first pioneers to settle in California. Union Station in Los Angeles was, in the year 1833, a large vineyard which was producing a superb wine and brandy. 1861 is of considerable import in these chronicles, for it was in that year that John G. Downey, then Governor of California, sent Agoston Haraszthy, a Hungarian nobleman, to Europe to bring back an array of unusual grape varieties which could be grown here. Haraszthy returned with 100,000 cuttings of 300 varieties of **Vitis vinifera.** In exchange, America sent cuttings of our native grape **Vitis labruscula** and with them a dread insect **Phylloxera** which was to lay waste vast acres of vines in France and Italy. Our native vines were not susceptible to this pest for they are hardier with respect to climate and disease resistance. By 1879 California's vines were also ravaged to such a degree that some wineries which had been producing nearly a million gallons of wine a year were completely devastated. Some unsung hero developed the idea of grafting scions of the delicate European grapes to the rootstock of hardy American vines thus saving the vines of the world. This practice continues throughout most of the wine producing countries of the world today. California had, prior to the **Phylloxera** plague, supplied many European markets with table wines. After twenty years of grafting

Pinot noir is a variety of **Vitis vinifera** which is among the most prized of the wine grapes.



Joshua and Caleb returning with the fruit of the vine. From **Biblia Decimaquarta** published in Strasbourg in 1518.

ALCOHOLIC BEVERAGES FROM PLANTS

Beverage	Primary Area of Production	Genera of Plants	Part Used
WINES:			
Grape	Europe and U. S.	**Vitis**	fruit
Flower	Europe (England)	**Taraxacum** and **Primula**	flower
Berry	Europe and U. S.	**Prunus, Rubus, Sambucus**	fruit
Mead	Scandinavia and Africa	numerous	nectar from flowers
BEERS:			
Ale	Germany and U.S.	All use **Saccharomyces** **Humulus** and **Hordeum**	barley grain and hops
Kvass (Quass)	Russia	**Hordeum, Secale**	grains (barley, rye)
		Mentha	peppermint leaves
Pombe (Bousa)	Africa	**Eleusine**	millet grain
Porter	Germany and England	**Hordeum** and **Humulus**	barley grain, malted and carmelized
Stout	Germany and England	**Hordeum** and **Humulus**	barley and many hops
Weiss	Germany	**Triticum** and **Humulus**	wheat grain and hops
Chica	South America	primarily **Zea** and **Chenapodium**	grains of corn or quinca
Cider	No. U. S.	**Malus (Pyrus)**	apple fruit
Ginger Beer	England	**Zingiber**	rhizome
Palm Toddy	Africa and the Orient	several spp. of palm	sap from wounded inflorescence
Pulque	Mexico	**Agave**	fermented leaf bases
Sake	Japan	**Oriza** fermented by **Aspergillus** fungus	steamed rice is hydrolized and fermented
Sorgho	Africa and Asia	**Sorghum**	grain
DISTILLED SPIRTS:			
Brandy	Europe and U. S.	**Vitis** primarily	fruit wine distilled and aged in wood
Whiskies	U. S.	**Zea** and **Secale**	Corn and rye grain malted, fermented, distilled and aged in white oak (charred) casks
Gin	England and U. S.	**Zea, Secale** and **Juniperus**	Corn and rye grains are malted and fermented. To the distillate juniper berries (cones) are added.
Rum	Jamaica	**Saccharum**	Distilled, fermented sugar cane juice carmelized
Absinthe	France	**Vitis** and **Artemesia**	Brandy and a narcotic wormwood
Akvavit	Scandinavia	**Solanum tuberosum Carum**	Potato distillate with caraway seed for flavor
Oke	Hawaii	**Oriza, Saccharum**	Molasses, rice distillate fermented in charred barrels
Tequilla	Mexico	**Agave**	Leaf base and stem tissue of Agave fermented and distilled
Vodka	Russia	**Solanum tuberosum** or **Triticum**	Distillate of potato tubers, or wheat malt

The drunken Silenus, companion and teacher to Bacchus. This 1510 woodcut by Hans Baldung Grien is illustrative of inebriation.

Humulus lupulus or hops gives the bitter taste to beer.

and replanting, the annual vintage was 28 million gallons from the golden state. This was due in large part to establishment of an experimental grape growing station at the University of California at Davis in 1880; a segment of the school of agriculture which has continued to expand and flourish.

Beer has a history more ancient than wine if somewhat less glamorous. Wherever a civilization has had a grain crop that same culture has had a beer. There is reason to believe that the infant civilization of man was nursed on beer. Mesopotamia has been called by anthropologists "the cradle of civilization;" in the earliest writings on clay tablets taken from recent excavations we find reference to "beer" as a part of a man's daily wage. Since barley **(Hordeum sp.)** was the grain of this civilization, we may assume that the brew was a fermented product of this cereal.

Beer production is an industry of considerable importance in California, where some of the world's largest and most elaborate breweries are to be found. Brewing begins with germination of barley seeds; a crop occupying extensive acreage in northern California. Malt represents a partial enzymatic breakdown of the storage products (endosperm) of the grain. After two days of steeping the barley in cold water, the grain is sprouted for four to six days and then the process is stopped by dry roasting at 180 degrees Fahrenheit (higher if a dark beer is desired). To this malt is added 35.0 percent other grains such as rice, corn, etc. to make a mash which is soaked at temperatures conducive to further enzymatic breakdown of the mash (then known as wort). Liquid wort is drained off and boiled with hops **(Humulus lupulus)** for several hours to give the bitter flavor which beer drinkers prize. Hops belong to the same family as does marijuana (Moraceae). Like marijuana, it is the inflorescence which is used for the complex oils which are in abundance on the flowering parts. California supplies much of the hops used in brewing. The plant grows as a vine over poles and wires making harvesting somewhat difficult. The now bitter wort is taken to starting cellars where introduced strains of yeast are used **(Saccharomyces cerevisiae)** to initiate fermentation under cool conditions. Complex procedures follow but the basic pattern is the further breakdown of sugars to yield alcohol and the carbon dioxide, the latter providing a head of foam on the final product. Beer in the market contains about 5.0 percent alcohol, malt, and sugar. Variants of beer are numerous and usually involve the substitution of grains other than barley and a change in the amount of hops. However, sometimes, as in the making of **chicha** in South America, numerous plant parts are used including fruits; thus, at certain points beer and wine become similar.

We have spoken thus far only of the gentle spirits that have been produced for thousands of years in which the alcoholic content does not exceed 13.0 percent. But what of the distiller's craft that has brought us whiskey, brandy, gin, vodka, rum and a host of liqueurs. We know that by the 10th century A.D. the Arabs had stills in which they utilized the principle that alcohol has a lower boiling point than water and may as a volatile substance be cooled and trapped as a liquid. It is this process of distillation which made possible the cocktail hour (another testimony to the ritualistic practice of the post-Columbian American). Distilleries in this country are producing close to 700 million gallons of distilled spirits destined for consumption annually. This compares favorably with the almost 200 million gallons of wine and 100 million barrels of beer per annum. Statistics which correspond with these are the 500 million dollars of lost wages each year attributed to alcoholism and the estimate that most of the homicides in this country are associated with alcohol consumption by one or both parties. Few people would admit that prohibition accomplished little more than encouraging a criminal blackmarket and the production of "booze" that was often toxic and fatal. Perhaps there is consolation in the figure which indicates that the per capita consumption of alcohol in the United States has dropped by about 40 percent since 1910. I would attribute this in part to the enormous increase in recent years in the use of another "release agent"—marijuana. Dr. Goddard, formerly of the U. S. Department of Health and Welfare, has stated that marijuana is no more dangerous than alcohol. However, he qualified his statement by citing the social problems created by excesses in alcohol consumption. One major difference is the physiological addiction which alcohol creates is not to be found in users of marijuana. It is estimated that five percent of our population is addicted to alcohol and can be classified as alcoholics. Perhaps the wisdom in St. Paul's counsel to Timothy: ". . . use a little wine for thy stomach's sake and thine own infirmities," is in the qualification, "little."

We cannot escape the conclusion that the origins of inebriating beverages are as many as the origins of human cultures, and like all psychotropic agents, alcohol has provided a respite from the growing pains of infant civilizations and a relief from the burgeoning problems of "mature" mankind. Perhaps one of the most neglected aspects of man, is as Aldous Huxley has pointed out, his desire to transcend himself; or, as the tent-maker and poet, Umar Khaiyam phrased it, ". . . to escape a moment from myself."

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Desert Fungus

An Endemic Disease and what to do about it

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Not so long ago three members of a Los Angeles County Museum of Natural History excavation team acquired coccidioidomycosis while digging for fossil vertebrate remains near Maricopa, California. This event, together with another recent episode, has created considerable interest among museum personnel, particularly those engaged in field work.

Coccidioidomycosis, also known as valley fever or desert rheumatism, is caused by the fungus **Coccidioides immitis** which occurs in the soil of the semi-arid and arid southwestern portions of the United States as well as in the soil of a few other areas of the world. The distribution of the fungus in the United States (Figure 1) corresponds generally with those areas characterized by a low rain fall; a high summer temperature; a characteristic plant life, namely, the creosote bush and cacti; and the occurrence of certain rodents, pocket mice and kangaroo rats.

Coccidioidomycosis is not contagious, and man and other animals acquire their infections from the same source: the soil of endemic areas. **C. immitis** grows in the soil and produces great numbers of spores (Figure 2) which are easily disseminated by air currents. It has been reported that the fungus disappears from the desert soil during the hot summer but that it persists in rodent burrows where it is protected from solar heat and radiation and that it may spread again over the desert floor after winter and spring rains. Furthermore, it has been repeatedly suggested that dust, bearing spores of the fungus, might contaminate objects transported great distances from the endemic areas and thereby precipitate infections in individuals exposed to such objects. The number of cases resulting from such object-contaminated transmissions has not been determined accurately but enough reports exist to convince one of the reality of the possibility.

The infection is most commonly acquired by inhalation of spores of the fungus. The consequences of such inhalations are highly variable. In the majority of instances (60%) individuals display no symptoms at all. Indeed the only evidence that infection has occurred is that such individuals react positively to a skin test with coccidioidin. This test is very much like the well-known tuberculin skin test in principle, and a positive reaction indicates that an individual has been exposed to spores of **C. immitis.** In the other 40% of infected persons symptoms develop which range in severity from a mild upper respiratory complaint to moderate or severe influenza-like disease. In less than 0.5% of those infected the disease may develop into severe, progressive mycosis in which the fatality rate is frequently very high. For reasons as yet unexplained the disseminated progressive form of the disease occurs more frequently in dark-skinned individuals, par-

Figure 1
Approximate geographic distribution of **Coccidioides immitis** in Southwestern portions of the United States

ticularly Negroes and Filipinos.

At the time of the Maricopa episode (November 1966) a number of questions were raised regarding the hazards which **C. immitis** presents to those engaged in field work in endemic areas. An investigation was undertaken by the authors to examine the following questions: (1) Could the fungus be found at the Maricopa dig site? (2) Was it possible that the fungus could be transmitted back to the museum with the collected specimens? (3) Was the sterilization technique used to decontaminate specimens effective? (4) What sort of recommendations could be made on the basis of the investigation of the preceding points?

The technical aspects of our study have been reported in a recent paper (Schmidt, R. T. and Howard, D. H., 1968, Public Health Reports, **83,** 822-888). The salient points from this article are summarized in the succeeding paragraphs.

The first paleontologic deposit discovered at Maricopa several years ago (Macdonald, J. R. 1967, Los Angeles County Museum of Natural History Alliance Quarterly, **6,** 21-24) was probably an ancient water hole near the foot of the mountains (Figure 3). The site is also in an area of known endemicity for **C. immitis.** Indeed, as anticipated, the fungus was isolated in the course of our studies from a rodent burrow less than 100 yards from the dig site. Thus the occurrence of the fungus at the site was established.

The basic objective of an excavation team is to obtain the fossil remains intact and to return them to the museum for identification and sudy. This objective is accomplished by carefully excavating all bones which can be removed easily from the soil (Figure 4). The specimens which are resistant to gentle digging are circumvented, and blocks of soil containing the bones are covered with plaster casts (Figure 5). The blocks are transported to the museum where the bones are carefully extricated and separated (Figure 6). Since the spores of **C. immitis** were present in the soil at the Maricopa excavation site, it was possible that the dust which carried the spores could collect on the surface of the plaster casts and be taken into the museum, exposing those persons working with the casts, or nearby, to the disease. However, the fungus was not isolated from any of the specimens taken directly from depressions on the surface of casts from the Maricopa dig site. Similar negative results were recorded on dust samples of specimens from the Sharktooth Hill site in Bakersfield, California and from the McKittrick dig site (30 miles north of the Maricopa site). Thus while the possibility of object-transmission is real, no evidence for its occurrence in connection with the casts sent to the Los Angeles County Museum was obtained. Nevertheless, such events are well-

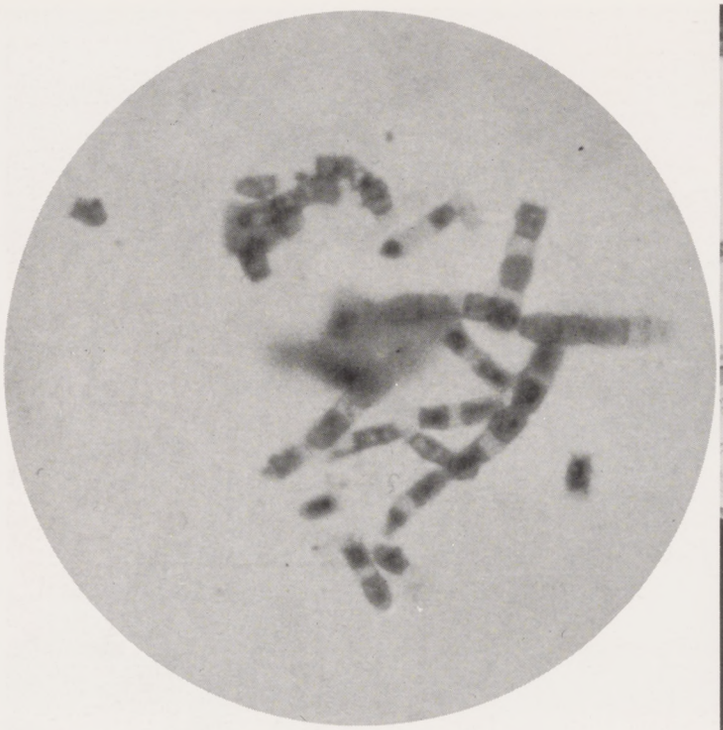


Figure 2
Spores of Coccidioides immitis from a culture. Such spores are produced by the fungus growing in soil and constitute the source of infection.

Figure 6
Opening the casts in the museum.

established in the literature about this disease and our negative results are not completely reassuring. Obviously it would be desirable to decontaminate specimens upon arrival at the museum before they are handled. To this end the following observations are reported.

At the time of the original episode at the Maricopa site, the possibility of transmission of the fungus to the museum was recognized and since then all specimens brought from Maricopa were fumigated with methyl bromide gas. Although such treatment is a well-recognized procedure to rid specimens of insect pests, the effect of the gas on the resident microbial population was not known. In our studies we established that after 48 hours of exposure to methyl bromide the fungus population was eliminated from the soils but that the specimens still had a substantial viable bacterial population remaining after treatment. Clearly, then, while methyl bromide removed the fungi from the soils it only partially reduced the total microbial population and accordingly the specimens were not sterilized. The latter is a trifle disturbing because although **C. immitis** is a fungus and might behave like the other fungi in the soils we studied, the fact that most of the bacteria survived indicates methyl bromide had a selective or partial effect. Thus it would not be possible to be certain that **all** fungi would be affected. More importantly we could not conclude that **C. immitis** would be killed. Under the conditions available to us it was not possible to test the sensitivity of **C. immitis** to methyl bromide directly. However, there is another gas which is known to be highly efficient in sterilization, **i.e.,** ethylene oxide. Furthermore, it is known that the latter gas is effective against **C. immitis.** Accordingly we recommend that serious thought be given to changing the gas employed in the fumigation tanks used to treat specimens brought from the field.

Finally, a few additional comments and recommendations based on the work of others is herewith supplied. From what has been said it is obvious that the greatest hazard of acquisition of coccidioidomycosis is for personnel at the excavation site. High temperatures and the nature of the work probably preclude the wearing of masks. However, the excavation site and surrounding area might be dampened with water in an effort to control dust. Such a procedure is obviously impractical under many circumstances. Recently an experimental fungicide, 1-chloro-2 nitropropane, has been shown to be effective against **C. immitis** in commercially feasible dilutions and quantities. It penetrates the soil sufficiently for partial and temporary control of the fungus within 24 hours of spraying. The fungicide is effective at 25° C and 40° C and leaves no soil residue. Not only could such a fungicide be used on the soil at the excavation site but it also seems likely that it could

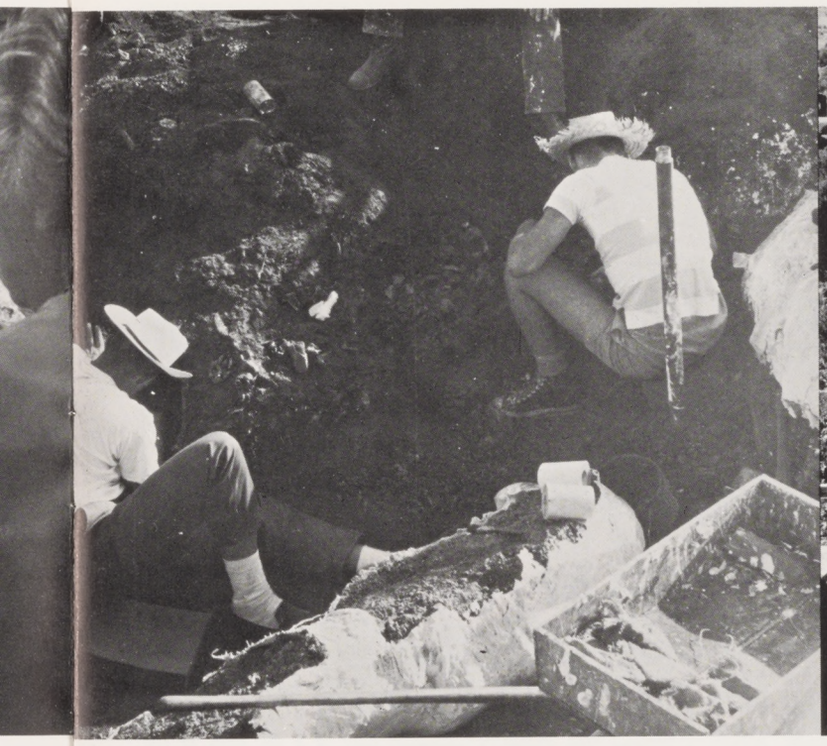


Figure 4
At work at the site

Figure 3
Maricopa excavation site.

Figure 5
Plaster casts at the site.

be sprayed on the outside of casts and other specimens before they are transported to the museum and thus reduce the likelihood of transmitting spores of the fungus with the specimens.

Other features of a control program for limiting the incidence of occupational coccidioidomycosis and reducing the severity of the disease in those who become infected have been outlined by Schmelzer and Tabershaw (Am. J. Public Health, **58:** 107-113). Their recommendations are paraphrased with particular reference to museum personnel as follows:

(1) Awareness: Know the endemic areas of coccidioidomycosis and recognize when a project is to be conducted in such areas. When a particular site has been shown to harbor the fungus (as in the case of the Maricopa dig site), consideration might be given to posting such areas with warning signs.

(2) Establishment of a medical program:

(a) Residents of endemic areas are often immune to coccidioidomycosis. Accordingly, hiring resident laborers may be possible.

(b) Skin test all employees. Positive reactors can work in epidemic areas with reasonable safety. Negative reactors are clearly susceptible and should be so advised. The additional hazard to Negroes and Filipinos should be clearly recognized.

(c) Negative skin reactors should be retested every 3-6 months. Conversion of skin test clearly indicates exposure. Such exposures should be evaluated.

(d) Prompt evaluation by a physician of any respiratory disease. Obviously coccidioidomycosis is suspect in such illnesses.

(e) An educational program on coccidioidomycosis should be a regular part of indoctrination of new employees. All individuals should be encouraged to seek prompt medical evaluation of respiratory disease and recognize the possibility of coccidioidomycosis.

Myth In Art:

A Huichol Depicts His Reality

By Peter T. Furst

Ramón Medina Silva, the Huichol Indian artist and **mara'akáme** (see box) who created the extraordinary "yarn paintings" in these pages, once said that even though the original Huichols are "long gone, far behind us," they are nevertheless also here and now. What he meant was that if one is Huichol, "if one has a Huichol heart," past and present are merged in what the Huichol perceives as historical and social reality. No matter how long ago it all happened, each generation learns it anew and insofar as possible guides its own existence and behavior by it. This sense of "being Huichol," with the implied superiority of the Huichol way over anything the outside world — colonial Spanish or modern Mexican — has to offer, together with the ruggedness and virtual inaccessibility of much of their present homeland in the Sierra Madre Occidental of western Mexico, has helped to preserve the 10,000 or so Huichol-speakers as the only major Indian group in all Mesoamerica with its aboriginal religion and world view still intact, with only the most superficial European admixture. Ramón puts it this way: "It is a very long time since **Tatewarí,** Our Grandfather, and the Sacred Deer Person **Káuyúmarie** taught the people how to live as Huichols, but as the telling remains from those times, those very ancient times, repeating and repeating everything, from one to the other, our great-grandparents, our grandparents, everyone, that is why we know it. Everything from those ancient times. Why it is still known. Why it lives in our hearts. As I tell it to you."

Ramón did more than "tell it" in words, although, as a born creative story-teller, he did that superbly. One day, not long after he had decided that our interest in his religion, his Huichol view of the world was genuine and posed no threat, he set about to do something entirely new in his artistic experience. This was to translate the rich oral literature to which he had agreed to introduce us, into two-dimensional story-telling form.

Two-dimensional translation of the native world view is something anthropologists frequently seek from their informants in the field. Such results can be invaluable aids to better comprehension of the native universe. This is true especially where there is no verbal equivalent for what the informant apprehends as his reality, or at least none that the outsider can understand. More often, however, no matter how talented

The Huichol term **mara'akáme** is not easily rendered into English. He combines in his person the functions of the traditional shaman, curer, priest and guardian of the sacred chants and traditions of his people. The making of a **mara'akáme** is a long and arduous process of self-training involving much physical and spiritual stamina and self-control — above all a sense of inner balance, of spiritual equilibrium. To be a **mara'akáme** a man must also have participated in at least five pilgrimages to **Wirikúta,** the sacred peyote country in the desert of San Luis Potosí, and to have proved his ability on these peyote hunts to take complete responsibility for the group of pilgrims whom he leads. On this hunt he assumes the identity of the **Mara'akáme Tatewarí** (Our Grandfather), the deified Fire and principal divine being of the Huichols, who also led the first peyote hunt in ancient times.

A nearíka (face, aspect, design) for the deified Sun, made in the technique of the folk art yarn painting, but intended for ritual use. In the center, the Sun, with his rays and fiery sparks which the mara'akáme must brave when he climbs into the celestial sphere in search of the rock crystal, perceived by Huichols as the crystallized soul of a deceased shaman which acts as a guardian power for the mara'akáme and his people. Around the Sun various symbols pertaining to Huichol ritual and the ancient traditions: at left, in green, Watákame, the Clearer of the Fields, in his canoe in which he and the little black she-dog escaped drowning in the great flood which destroyed the world; when the waters receded, the black dog changed into a girl when Watákame burned her skin. Below the canoe a serpent symbolizing the waters; above, in blue, the sacred deer, a manifestation of Elder Brother Káuyúmarie, the spirit helper of the mara'akáme. Top center, the double-headed eagle, symbolizing Tatéi Wérika 'Uimári, Our Mother Eagle Girl. Facing the blue deer is another manifestation of Káuyúmarie. Below him, the maize plant, with the girl who guards the sacred paraphernalia in the god house for the Sun, symbolized by a gourd for the purifying sacred water, a votive arrow (in red, bottom center) and a white candle.

In ancient times, the Huichols did not know maize. But a young boy heard of some people over the mountains "who have something called maize," and he goes in search of them. On the way he meets a group men who tell him they are going to purchase maize and trustingly he accompanies them. But he does not know that these people are really ants (the insects in this picture), the Ant People who steal by nibbling at anything they can find. At dawn he awakens under a great pine and finds that they have nibbled away his clothes, his hair, even his eyebrows, leaving him only his bow and arrows. When he hears a bird landing in the top of the tree, he aims his arrow at it, for he is hungry. But the bird speaks to him, revealing that she is really **Tatéi Kukurú 'Uimári,** Our Mother Dove Girl, the Mother of Maize. She tells him to follow her home, where she will give him maize.

Two yarn paintings illustrating the story of the origin of maize.

The Mother of Maize changes from dove to human shape and introduces the boy to her five daughters, symbolizing the five sacred colors of maize—white, red, yellow, speckled and blue. The boy is hungry, and the Mother of Maize gives him a bowl with tortillas of five colors and a gourd bowl full of atole. He does not think it enough to still his hunger and thirst, but tortillas and atole magically renew themselves so that in the end he cannot finish. The Mother of Maize asks him to choose a girl, and he takes Blue Maize Girl, the most beautiful and sacred of all. But his own mother greets him with anger, because instead of maize he brings another mouth to feed. He explains that the girl herself is maize, that she must be treated well or she will leave. The mother fails to understand and the girl deserts them, because they did not know that maize is sacred and must be revered.

the informant may be in the oral arts, he finds it difficult or impossible to make a satisfactory transition from his own, multi-dimensional inner experience into an alien two-dimensional medium. With Ramón we faced no such problem. But then he is an exceptional individual — not merely the gifted artist constantly seeking new modes of expression, but a religious specialist deeply committed to the preservation of his world and often given to profound thought and philosophical speculation.

Ramón was born on a small rancho called Las Cuevas in the district of San Sebastián, one of the five semi-autonomous territorial regions which together constitute the present Huichol homeland. The total area measures approximately forty miles from north to south by twenty-five east to west; there are no roads leading in or out, so that the widely scattered Huichol family ranchos (there are no pueblos or villages) are accessible only by walking or riding or by flying in to one of the few unpaved landing strips on the mesas, and then walking. When we first met Ramón in 1965, he was about 39 years of age. He had then been living for four years on the outskirts of Guadalajara with his wife and their little adopted daughter, 'Uráme. Here, at the northern edge of the second-largest city in Mexico, they had recreated for themselves a Huichol world in miniature, an Indian microcosm outside the borders of the Huichol homeland — a small, windowless hut with a free-standing ramada of poles and palm-thatch and a tiny milpa of maize and beans where, but for the occasional roar of passing motor traffic, one could forget one was not in the Sierra and that only a few yards away was a major highway leading north from Guadalajara to Saltillo. In those days, between 1965 and the spring of 1967, when urban expansion wiped away the little rancho and Ramón decided to move back to the Sierra, on any given morning one might find in the shade of Ramón's ramada the most astonishing variety of visitors — male, female, young, old, Mestizo and especially Huichol. For the latter, Ramón's little urban rancho was a haven, a familiar, friendly, Huichol world within the unfamiliar city, a place to find Huichol talk and Huichol music, a meal, a

few pesos, a beer or soft drink, or at least a roof beneath which to sleep in the security of one's own people. Most important, in Ramón himself there was for them an intermediary through whom to deal with the mysteries of urban civilization, for he seemed to bridge with astounding ease the enormous gap between the Huichol world and urban Mexico. Not that Huichols are easily cowed or intimidated by the unfamiliar or powerful — their sense of dignity and self-worth is too great for that. Huichols do not have to search for their identity, as do so many of us, but barriers of language and culture can be overwhelming, especially when you are poor and others seem so very rich.

On occasion the two worlds, Indian and urban, converged simultaneously on Ramón, both seeking his aid. One time, I recall, there came an old Huichol with poor and tattered clothing who, it turned out, was actually the **'uquiyári** (chief, guardian, governor) of one of the five Huichol districts. Himself as poor as any of those who had chosen him their **'uquiyári** (Huichol governors are annually or semi-annually elected by a council of local family headmen), barely able to make himself understood in Spanish, he had come to Ramón for help in negotiating with the Governor of Jalisco for maize to tide his hungry people over until harvest time. Not long afterward there appeared a Christian Mestizo who asked Ramón to please cure him of **susto** (fright sickness), for which the doctor at the hospital had no medicines (and which, in any case, he would probably not have accepted as a legitimate clinical condition) and about which even the padre, with the help of the Virgin of Zapopan, the patron saint of Guadalajara, could do nothing at all. Surely Ramón, as an Indian, would have that special knowledge and magical power to drive away the evil which was killing him? We thought the juxtaposition ironic — two worlds focusing on Ramón, both seeking his intervention — the one for his knowledge of the ways of the city, the other for those magical powers which the city (or at any rate some of its residents) ascribed to him precisely because he was an Indian. But Ramón did not think it ironic at all; he saw himself quite clearly as a man straddling

Five years after death, the soul of a deceased **mara'akáme** or other person of great wisdom forms itself into a rock crystal and announces its desire to return to earth to dwell among its relatives as a guardian spirit. It is the **mara'akáme's** task to climb to the Otherworld, into the realm of the Sun, to bring the crystallized soul to earth. Lower right, the **mara'akáme** wears on his head two divining plumes or arrows which stand for the horns of the sacred deer and thus represent his shamanic power. At the end of his path the crystallized soul awaits him. In order to reach it, the **mara'akáme** must penetrate a fiery curtain of solar rays (represented by the four zig-zagging lines at top, center), and this he can accomplish only with the help of Elder Brother **Káuyúmarie,** the sacred deer and spirit helper of the **mara'akáme.**

The Huichols have no word for God or gods; their divine beings are called by kinship terms, such as Great-grandfather, Mothers, Grandfather, Elder Brother, etc. The principal one is **Tatewarí,** Our Grandfather, the deified Fire and First **Mara'akáme,** shaman-priest of the Huichols. Here he is the burner of the dry brush in the annual clearing of fields for maize planting. The red color represents fire, the black on his face charred wood, the white above his head both ashes and white smoke, the yellow dots sparks. He lies in the midst of green brush and trees outlined in yellow, again symbolizing the fire which consumes them. At lower right is a small fire, the colors red, white and black standing for flame, charcoal, ashes and smoke, and the whole representing **Tatewarí** in another manifestation.

At death, the soul embarks upon a bifurcated path into the nether world, seen here from above. The left-hand path is for transgressors against incest taboos and the prohibition against sexual relations with "Spaniards" (non-Indians), the right-hand path for all good Huichols. Above the bifurcation, the "ringing stones" on which the soul signals its arrival. Along the left-hand path, the purifying fire and a thorn on which the soul of the offender is temporarily impaled; next, clashing rocks through which the soul must slip, and twin pools of hot and foul-smelling water. Along the right-hand path, the black dog which guards the way; a crow which refuses to feed the hungry soul; the opossum, whose dead-fall trap of stone threatens to catch the soul of those who ate forbidden opossum meat; a caterpillar symbolizing the first sexual experience and a pool of water.

The temporary destination of the soul of an offender against the sexual mores is a corral of angry mules, of which one calls out, "I was the one with whom you took your pleasure." The soul, shown as a skeleton, attempts to rope the mule but is trampled for its sins. The sex of the mule depends on that of the soul—a male mule for the female soul, a female for the male. The symbolism of the mule is double-barrelled: the mule is the animal of the "Spaniards," and thus alien, and it is sterile, which refers to the Huichol belief that anyone engaging in sexual relations with a "Spaniard" or a close relative may become sterile. The punishment is temporary, there being no concept of eternal punishment in Huichol religion; the soul is allowed to retrace its steps and embark on the right-hand, or proper, path into the underworld.

In its five-day journey to the land of the dead, the soul is burdened down with all the evidence of its sexual life—the female soul carrying male organs (lower left) and the male carrying vaginas (lower right). Eventually it arrives at a great tree of life, a **xápa** (wild fig) laden with fruit, around which the previously departed await it in the form of disembodied heads. The soul flings the sexual organs at the tree, bringing down fruit which the assembled spirits consume in a great feast, which also entails the drinking of much **náwa,** or maize beer, and the consumption of peyote. The newly arrived soul then joins the other dead in dances around the fire, symbolized by the artist in the three circles. All of these adventures of the soul are recounted by the **mara'akáme,** or shaman-priest, to the relatives of the deceased in a "soul-calling" ceremony five days after death.

The final act of the soul-calling ceremony is the capture by the **mara'akáme** of the soul which arrives on the tips of his feathers in the form of a luminous insect. The assembled relatives wait to bid it farewell. The larger white figure at bottom center is a "soul catcher," who ties up the soul with his rope after the **mara'akáme** has disabled it during its drunken revelry in the underworld. If the soul is female, the **mara'akáme** stops its dancing with five sticky burrs, if male, with acacia thorns. Once the soul is tied up, a wasp carries it up out of the underworld. After the relatives have greeted and "fed" it its favorite foods and drink, the soul is escorted part of the way to the beyond by the **mara'akáme.** At top, the votive platform on which are placed the earthly belongings of the deceased.

Four yarn paintings illustrating the Huichol tradition of the journey of the soul after death.

two worlds, learning to cope with both, enjoying whatever material benefits he might derive from the one while in his heart remaining firmly committed to the other.

The principal material benefit was the ready market Guadalajara offered for his art work, especially his prodigious output in decorative "paintings" in colored wool yarn. In fact, what had originally brought him to Guadalajara was the Huichol folk art museum and store established at the Basilica of Zapopan by a Franciscan priest sympathetic to Huichol culture, Padre Ernesto Loéra Ochóa, who for a time purchased everything Ramón could produce and who also first introduced him to us.

The concept of "painting" with yarn as an authentic expression of indigenous Mexican folk art requires some brief discussion, the more so since much spurious "Huichol" art has lately appeared on the market. This, of course, harms both the Huichol economy, which as it is has few sources of cash income to augment its precarious reliance on maize farming, and also harms the development and preservation of Huichol art and craftsmanship. This spurious Huichol art, in turn, encourages still more imitation and a gradual breakdown of traditional forms, because in order to sell their work some Huichol artists (Ramón excluded) feel themselves forced to imitate the imitations. Unscrupulous entrepreneurs have even introduced Walt Disney characters into Huichol art and excuse this by claiming it helps the Huichols economically!

The preservation of authenticity and high quality in Huichol symbolic and decorative art is being greatly encouraged by the Huichol-Cora Center of the **Instituto Nacional Indigenista** (National Indian Institute) in Tepic, Nayarit, at this writing headed by the Mexican social anthropologist Salomón Nahmad Sittón. Ramón, too, is now selling much of his art work through this Center.

So far as the authentic yarn painting is concerned, not only some of the principal motifs but also the techniques derive from traditional ceremonial art. The underlying concept — two-dimensional juxtaposition of animals and other symbolic objects to make a complex whole — has its roots in part in the traditional **nearíka** (face or aspect, but also meaning simply design or representation), a ritual object taking many forms and made by many techniques.

A **nearíka** can be as simple as a few lines scratched into a disk of compacted volcanic ash, or as complex as a large circular or polygonal shield made of bamboo splints interwoven with colored yarn so that the whole beautifully depicts a series of animals and other symbols pertaining to the divine being for whom the **nearíka** is intended. Some **nearíkas** may also be oblong pieces of flat wood decorated with conventionalized beeswax effigies of animals and other forms embellished with bits of colored yarn, seeds or beads. The same technique of symbolic decoration is used on votive gourds, called **xukúri** in Huichol. It is this combination of beeswax with colored wool which inspired the technology of the modern folk art yarn painting; indeed, the beeswax base for the yarn design is an indispensable first criterion of authenticity.

The Huichols themselves call the yarn painting **nearíka,** and of late **nearíkas** made in the typical wool-on-wax technique of the folk art yarn painting, rather than in the more traditional techniques mentioned above, have found a place in the inventory of ritual offerings to the divine beings (the Huichol have no word for "gods"; what we would call deities they call by such kinship terms as Our Grandfather, Our Great-grandparents, Our Mothers, etc.). Thus the yarn painting has come full circle — derived from the traditional **nearíka** which it secularized into folk art, it has now itself become a new form of sacred **nearíka.** There are, however, important differences between folk art yarn paintings and those meant for ritual use. First and foremost of course is the difference in the artist's motivation and the work's intended function, one being commercial and the other sacred. There are also differences in form and materials. Folk art **nearíkas** are rectangular while ritual ones may have their corners rounded, conforming to the traditional decorated disks of tufa or the round, shield-like **nearíkas** of bamboo splints and yarn. Also, ceremonial yarn paintings are always made on wood, since wood is considered "authentic"—meaning prehispanic — whereas the composition board now used for most folk art yarn panels is considered to be "Spanish," and hence unacceptable in a ritual context. The rounded yarn design reproduced here in color is a superior example of a new-style ritual **nearíka** for the divine Sun made by the technique developed for the folk art yarn painting.

In making such a work Ramón begins with a board of wood or composition material which he covers, a small part at a time, and always with his thumb, with an even layer of beeswax mixed with a small amount of resin. The wax is solid, and in order to be applied must be softened by the sun. It is never melted over a fire. The design is sketched into the wax with a sharp instrument — any error can easily be removed by smoothing the wax with the fingers — and the individual figures are then outlined with colored wool yarn. Ramón never begins the laying in of the wool without first framing the entire picture, usually with three alternating colors. Once the individual motifs are outlined they can be filled in, two strands at a

The Huichols have many stories about maize, and all of them are, in one way or another, quite sad. Here Ramón illustrates the story of Maize Baby, symbolizing maize, who was born to a man and woman in ancient times. But the parents did not like their child because it fouled the house as it crawled about. They put the baby outside and wherever it crawled, flowers grew. As it cried, the Mother of Maize, Our Mother Dove Girl, heard it and came to carry it to her house. The parents tried to get it back but failed, because they had not loved and cared for it enough. On three sides of this yarn painting are the flowers the maize baby made as it crawled about. At the top, the dove, symbolizing the Mother of Maize. Bottom right, the baby's human mother, nude, for in ancient times the people wore no clothes.

Four yarn paintings pertaining to Ramón's fourth peyote pilgrimage, in December, 1966, in which the author participated with another anthropologist. Ramón's fifth, during which he was invested with the full powers of the mara' akáme, took place in December, 1968, and in this, the most sacred and important event of his life, the author and his wife, Dee, were permitted to participate and to record its major rituals on film and tape.

time, beginning either from the edges and working inward in rectangular or polygonal spirals or outward from the center. Large areas with solid color are laid in mosaic-fashion, a small section at a time, in order to arrive at a pleasing change of texture even within a monochromatic area. The technique is very hard on the fingertips since the wax hardens quickly after application, and as time goes by more and more pressure is required to get the wool yarn to adhere properly to the base. On cold days it is almost impossible to make a yarn painting because the wax never reaches the proper consistency; Ramón prefers to work in the open shade on sunny days so that when necessary he can place the unfinished yarn painting temporarily into the sunlight to soften the wax. Hot days are equally unfavorable as cold, since then the wax remains too soft, and there is the additional danger that the melting wax might soak into the wool design and ruin the picture. Choice of colors is rather arbitrary, unless the mythic subject dictates certain hues. But in general the brightest colors are preferred—this, interestingly enough, because, according to Ramón, the more brilliant the colors the more nearly they conform "to that which one sees when one has eaten peyote."

As mentioned, the evolution of Ramón's personal style from purely ornamental art to story-telling illustrations of the sacred lore was directly related to the gradual development of a relationship of mutual respect and trust between us. Though technically and aesthetically superior to the work of other Huichol artists in this medium, his early work conformed to a general decorative art tradition developed in the last decade or two in which certain symbols are selected from the inventory of sacred motifs and juxtaposed in ornamental panels in a colorful, pleasing but essentially meaningless arrangement which Huichols call "adornos" in Spanish. Deer, flowers, eagles, butterflies, snakes, sun, moon, clouds, trees, etc., are favorite motifs.

At about the time we met him, Padre Ernesto had also prevailed upon Ramón to try his hand at visualizing and depicting the characters of a Huichol ceremony or tradition, and though one or another of these approached story-telling quality, Ramón himself continued to regard them as "adornos," purely decorative art, without sacred meaning in the sense of his later yarn paintings done for us. Here again the principal difference was in the artist's motivation, his own perception of what he was trying to accomplish. This was true also of Ramón's finest earlier works, measuring three by six feet, of which Padre Ernesto was so proud he hung them in the Basilica's permanent collection rather than

The hunt for the peyote in **Wirikúta,** sacred land of the divine ancestors and the psycho-active peyote cactus in the high desert of San Luis Potosí, in north-central Mexico. Ramón depicts himself on the right, firing his arrow at the first peyote, its body in green above ground, its roots, in yellow, below. From the center of the peyote rises a stream of color—the soul or life force of the peyote—attempting to escape. The manner of self-portrayal is significant: from his head emerge deer horns, the horns of power, and his body is skeletonized, showing the ribs, symbolizing shamanic initiation through ritual death and rebirth. Such symbolic skeletonization of the shaman's body is a well-known phenomenon in shamanism. Both men carry gourds for the sacred tobacco, called **yá,** a mark of the peyote pilgrim. The contrasting colors represent transition from one plane to another, which comes with the succesful "slaying" of the first peyote.

Each of the companions on the peyote hunt receives a new peyote name, which **Tatewarí** reveals to Ramón as he dreams his peyote dreams. Here Ramón depicts the dream which conferred the name **Tsinuráwe,** after the small fuzzy buttons which mark the top of each section of a peyote, to USC anthropologist Dr. Barbara G. Myerhoff, reaching toward a decorated gourd bowl topped by a peyote. Below is **Tatewari,** the Fire, at left the female deity Our Mother **'Utuanáka,** guardian deity to whom the gourd bowl and the feathered votive arrow in the center are given as offerings.

The individual experience of the "dreams" or visions induced by the peyote are considered to be too sacred to be discussed or shared, even among the participants in the ritual. Nevertheless, Ramón agreed to try to translate some of his peyote "dreams" into pictorial form, at least insofar as they pertained to the participating anthropologists who were not themselves of Ramón's culture and so were to some degree exempt from the ritual strictures of the peyote hunt. In this yarn painting Ramón shows how he experienced the fire, **Tatewarí,** as he sat quietly eating peyote at the campsite in **Wirikúta.** Flanked by two peyote plants, the fire is shown exploding in a shower of multi-colored flashes and rays of great brilliance and luminescent splendor, each ray dissolving into its component colors. Below ground are **Tatewarí's** "roots", above, the night sky—a deep blue shot through with fiery reds—is turned into a blinding yellow, the color of the noonday sun in the desert sky.

This yarn painting is of Ramón's peyote vision pertaining to the author as participant in the 1966 peyote hunt. The name dreamed by Ramón was **'Ůru Tsáta,** Where the Arrow Stands. Bottom right, the author, reaching out for the arrow symbolizing his peyote name. Also, **'Ůru Tsáta,** is a sacred place name on the way to **Wirikúta.** Upper left, the Sun to whom **'Ůru Tsáta** must make his offerings, a votive arrow and a gourd bowl, decorated with four-direction symbols (crosses) and the little black she-dog which, after the great deluge in which the world was drowned, transformed into a woman who became the mother of mankind. The sacred fire is depicted at lower left as Ramón experienced it in his trance. The peyote names are temporary, pertaining only to the peyote hunt during which they were dreamed, and are changed in subsequent peyote pilgrimages. Thus, in 1968 the author and his wife received new peyote names, revealed to Ramón in his peyote visions on the final night of the ritual.

In ancient times there was a dangerous sorcerer, **Kiéri Tewíyari,** Datura Person, who tried to mislead the people with his hallucinogenic powers. **Kiéri** was finally defeated by the sacred Deer, Elder Brother **Káuyúmarie,** who used peyote to fortify and immunize himself against the dangerous poisons of the sorcerer **Kiéri.** Here **Kiéri** is shown falling over backwards (lower right), after **Káuyúmarie,** with the horns of the deer on his head, "killed" him with five arrows. As he dies, the fox, animal of sorcerers and death, barks at upper left, and sparks and brilliant flashes of color representing diseases spew forth from the dying **Kiéri's** mouth. Above him appears his other manifestation, the Datura (Jimson Weed) plant, into which he changes, for he does not truly die but only transforms himself to bewitch the people with his juices.

The birth of the Sun took place in a great volcanic eruption in the mountain called **'Unáxu,** the Mountain that Burned, in **Wirikiúta,** the sacred land of the peyote where the Ancient Ones, the ancestral deities, dwell and where each year small groups of religious Huichols go to hunt the peyote. At right the **mara'akáme,** the shaman-priest, greeting the rising Sun and helping him to ascend properly into the sky. The serpent symbolizes the dangerous animals in the underworld through which the Sun must travel each night after it sinks below the horizon into the sea, itself symbolized by a great serpent which tries again and again to devour the Sun.

Although he was vanquished by Elder Brother **Káuyúmarie,** who stands for the divine peyote plant, **Kiéri Tewíyari,** Datura Person, the chief of sorcerers, poses a danger to the people, because he misleads them into using the hallucinogenic Datura, which creates "terrible visions." Here **Kiéri,** upper left, appears, bewitching a woman into climbing the rocks to reach for the sap of the Datura plant, which **Kiéri** has made her believe is "good to eat, like little tortillas." In her Datura hallucinations, she thinks she can fly. If she tried she would be killed; but Datura Person keeps waking her from her hallucinations just in time, so that he can bewitch her into becoming a sorceress. The **Kiéri** traditions are told by the **mara'akáme,** the shaman, on the peyote pilgrimage; otherwise Huichols do not speak of **Kiéri,** who is regarded as evil and dangerous.

The Huichols have an indigenous tradition of a great flood which bears a superficial resemblance to the Judeo-Christian tradition of the deluge, but which nevertheless is pre-European. In the Huichol story, a man named **Watǎkame,** Clearer of the Brush, is told by **Nakawé,** the ancient generative earth deity, to build a canoe-shaped box to save himself, a small black female dog, fire, five grains of maize and five beans, from the impending flood. After the waters recede, she recreates trees, plants, flowers and animals; the female dog assumes human shape and the pair repopulates the world. Here Ramón illustrates elements of the flood tradition: the white-haired **Nakawé,** the canoe with maize, beans and fire, two serpents symbolizing the waters, and animals which abound in the sea. The irregular white lines represent the mountains and clouds.

In the "first times" all was darkness. The people had fire—**Tatewarí,** Our Grandfather—but the Sun had not yet been born. The people wanted the Sun and, at the behest of their shaman, they chose a young boy to be the Sun. Four times they threw a boy into the water (in other versions it is fire) and four times the water rejected the boy because he was not pure enough. The fifth boy, the son of a poor woman who lived alone without a husband, was found playing by himself, shooting arrows at a target of cactus leaves. He was accepted; descending the five levels of the underworld he travelled to **Wirikuta** where he emerged from a volcano and, with the help of the Shaman, **Tatewarí,** climbed into the sky. The boy is shown in the bottom half of this yarn painting, with the waters into which he was thrown, at left. His mother expresses her grief with outstretched arms, at left is the boy as the newborn Sun. The two halves of the yarn paintings are divided by the path the boy took in ancient times and which the Sun repeats each night.

Párikuté, the "owner" of animals, was afraid the scorpion might harm people and asked Buzzard to carry away a basket of the kind used by shamans. This was to be placed high on a shelf. He did not tell Buzzard what was inside—the most dangerous of all the scorpions—and ordered him not to peer into the basket, because the thing imprisoned in it might escape. But Buzzard was curious and opened the basket; the scorpion dropped out and hid. Buzzard could not find him and that is why one is plagued by scorpions today. Here we see **Párikuté** on his little seat, spitting blood symbolizing death which often follows the sting of scorpions. Above flies Buzzard and below is the **takwátsi,** the shaman's basket from which the scorpion escaped, flanked by symbols representing the peeling bark behind which scorpions hide. The deadliness of the species of Scorpion facing **Párikuté** is symbolized by the seven colors in his tail and the black lines on his back; the others are relatively harmless.

allowing them to be sold. Clearly, Ramón's was a superior talent, but the question was, how long would it be before his work, too, deteriorated under the pressure of commercialization, as had the famous pottery of Metepec and Acatlán? It seemed important to encourage him to adhere to his own high standards, and it was with this in mind that he was commissioned in 1965 to make his first yarn paintings for the collection of the UCLA Museum of Ethnic Arts. Also, from the first there was something about the man which was difficult to define, some special quality, another dimension barely hidden behind the easy-going, jocular manner, the feigned ignorance of Huichol "secrets," as he called them, the patently distorted stock explanations of Huichol symbolism which he gave inquisitive tourists. It struck us that Ramón might be wearing a false face, but that it was barely possible that by approaching him through his art we might someday be allowed to look at the real man, and through the man, at his culture. And so it began, until eventually Ramón told us that his grandfather had been a famous **mara'akáme** and that he himself hoped in his heart to follow his example, to "complete" himself, as he put it. Nevertheless, another year was to pass before he spoke with complete frankness; by then he had decided that we were strangers no longer but "companions," and that the glimpse he was allowing us into his culture would not harm but rather help preserve — by being put on paper, film and tape — all that which goes into "being Huichol." Thus came about a large collection of Huichol oral literature and art, and some understanding, however incomplete, of what the Huichol means when he speaks of "having a Huichol heart." Eventually, also, it led to Ramón's acceptance of us as companions in the most sacred event of Huichol religion, the peyote hunt, the first time in 1966, and again in December, 1968, when Ramón allowed my wife and me to participate in the pivotal moment of his life. That was his achievement of "completion," his becoming a full-fledged **mara'akáme** on his fifth peyote pilgrimage to **Wirikúta,** the sacred land of the divine ancestors of the Huichols in Mexico's north-central high desert.

All photos, including those of Ramón's yarn paintings, by the author. Yarn paintings shown, courtesy of Museum of Ethnic Arts, UCLA. Color separations courtesy Barclay Color Reproductions.

Pre-Columbian and Mestizo Music of the Western Hemisphere

by **Elisabeth Waldo**
Studio of the Americas

The first American music was born of an Indian heritage, and the music of the Pre-Columbian era has been among the most neglected of the great world cultures.

Volumes of books exist pertaining to the story of musical instruments throughout the ages, but in the past little attention has been given to the musical contributions of the Western Hemisphere.

It is true, a musical notation as we know it, had never been developed prior to the invasion of Cortez in the New World, but the existence of a variety of musically important instruments remaining in playing condition today, after excavation from archaeological sites, give testimony to the genius of the anonymous aboriginal musical masters who created them.

One has only to scan the pages of fray Bernadino de Sahagun ("Ancient Mexico," Fisk University Press, 1932) to conjure up the atmosphere in which this musical expression of Ancient America was first realized. The colorful description of the ceremonial life goes a long way in lifting the shroud of mystery which has been concealed in the case of the music, and so much more revealed in the art.

Perhaps one of the greatest detriments to an understanding and flowering of this music in our time was the disservice caused by the early reporting of individual authorities who judged the vestiges and characteristics of the music they heard in the post-classic period, by purely European standards of the day, rather than fairly evaluating the music in its own barbaric environment and setting. Had their ears been tuned to the strident sounds of today, they would have discovered musical relationships of pitch and timbre that we have not yet accomplished in our modern instruments. The ancient Americans, it would seem literally "tuned in" to the universe and its mysteries.

The use of imaginative materials in instrument making such as baked clay, sea shells, copper, gold, reed, silver and wood, to name a few, all contributed to the exotic effect. The use of deer hooves, cocoon rattles, and human and animal bones were some of the other ingredients used in the formation of these unique instruments.

If we but dwell a moment on the "Teponaztle," the tuned sacred slit drum of the Aztec, and the "Tlapitzallis", multiple flutes, capable of producing sixteen sounds singly or simultaneously, as only two small examples, it is possible to imagine what further study would reveal musically in the imaginative ocarinas, and varying winds and percussion of zoomorophic and anthropomorphic forms

It is to be lamented that the ax of the Conquistador cut short the possibility of scholars actually discovering the true musical merit just lying beneath the surface of these sonically and visually fascinating "instruments of the devil", while they were still being produced at the time of the Conquest.

Nevertheless the tragic events of that period led to the creation of a new music, the Mestizo, which was a blending of Indo and Hispano resources. This music in turn expressed an impact of sensations that endured all through the colonial period of three hundred years during the sixteenth, seventeenth and eighteenth centuries. The Indians readily assimilated the music of the colonists and proceeded to set about carving their own folk violins and guitars throughout the length and breadth of the Western Hemisphere. They turned out especially numerous and interesting ones in the Andean area of South America, parts of Central America and on the West and East Coast of Mexico. The "Ee-neng," one stringed violin of the Seri on the Gulf of California and the "Charango," ten stringed armadillo-backed guitar of Bolivia, are just two examples of a brilliant array of folk instruments created by the Indian races whom the Spanish were forced to admit were possessed of a "quick" musical talent.

The Spanish missionaries of the sixteenth century who penetrated to remote areas at an early period can be given a great deal of credit for introducing the Indians to the string instruments of Europe as well as the choral forms.

Both the instrumental elements and the new creativity in musical patterns resulted in such intriguing rhythms, still in use today, such as the "Huyano", "Cueca", "Carnavalito", "Bailecito", "Tamboritos", "Corridos", "Huapango", "Vals Crillo", to name only a few.

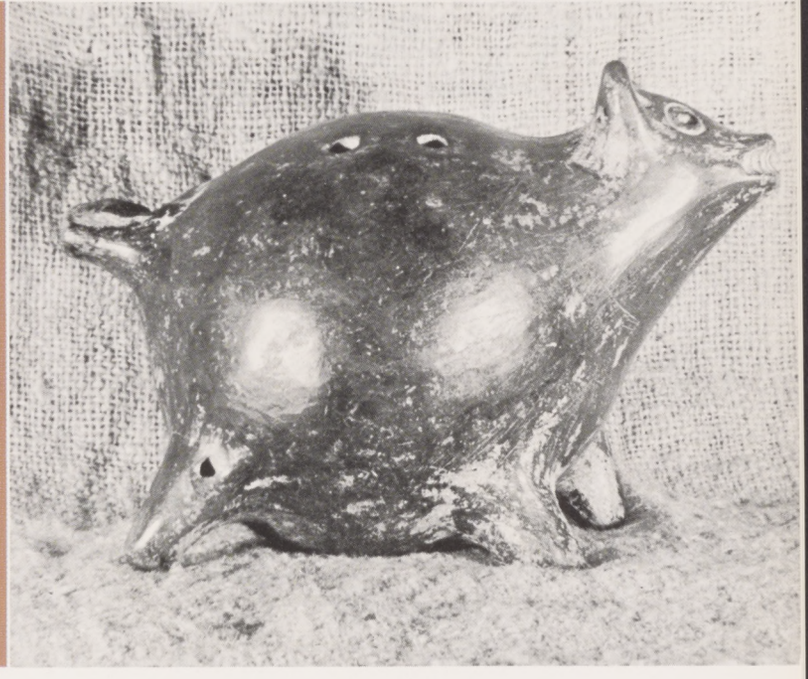
The particular blending of elements and attitudes that go into making up "Mestizo" music could not be, nor has ever been duplicated in any other area of the world. At least Pre-Columbian and Mestizo music should be considered more seriously as the basis of a real American "idiom" with unlimited possibilities for new dimensions in music and dance. It is to be concluded then, that independent of influences from the Old World, the music and musical instruments of North, Central and South America are capable of making a greater impact on the music of the future inspired by our rich aboriginal inheritance.

Post-classic
"Pentaphonic" flute
with human figure
perched on barrel,
being played

Double flute,
Mixteca culture,
being played

"Tzit-idoatl"
played by Elizabeth
Waldo

"Quena," pre-Inca flute,
being played

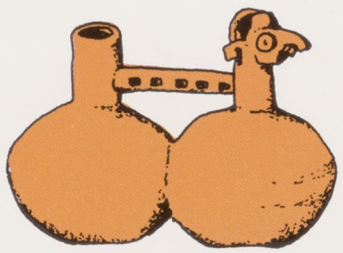


Huehuetl,
Aztec carved drum

Multiple Flute
with head
of Aged Man

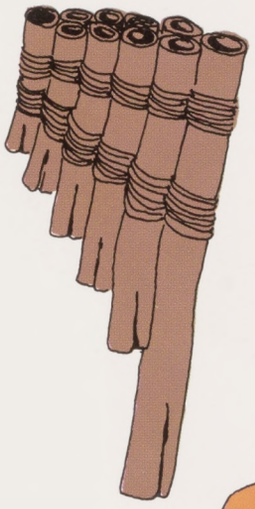
"Salterio"
from Puebla, Mexico,
being played

Animal-shaped
Bass Ocarina



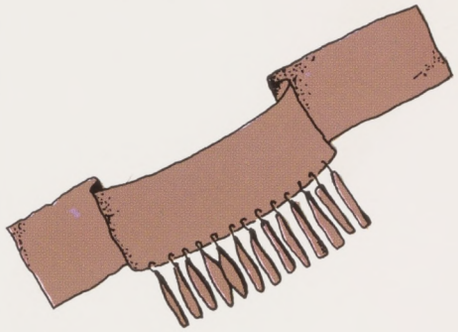
A Maiden flute made of box-elder wood (California Indian tribe)

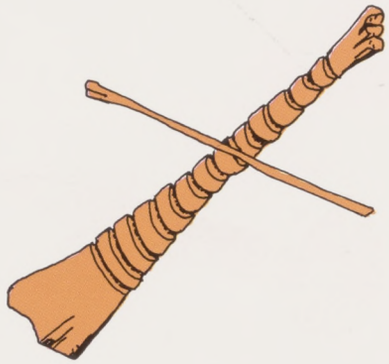
Sacred whistling jar of Peru. Ceremonial significance (Pre-Inca)



Zampona
Pipes from Bolivian section

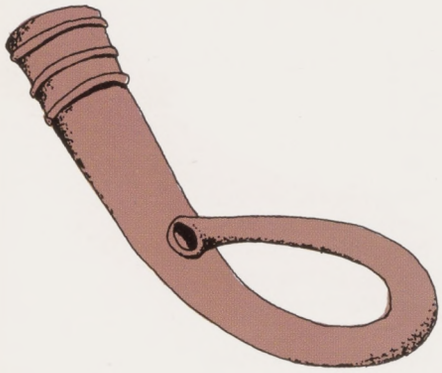
Ceramic Bell Trumpet
(Pre-Inca)
Nazca Civilization

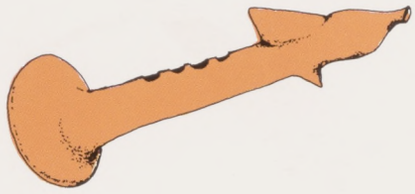




Authentic belt used by Sun Maidens. Used in Sun dances carved llama bone (Inca)

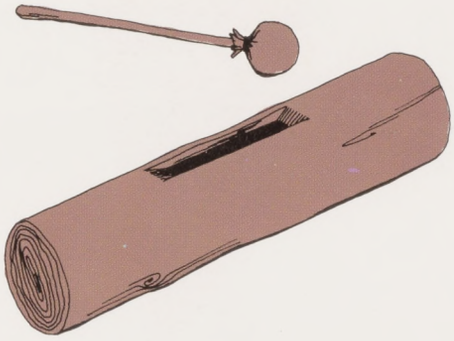
Omichicahuaxtili
Human bone rasp
(Aztec)

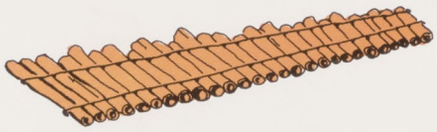




Ceramic bent trumpet
Mochica (Pre-Inca)

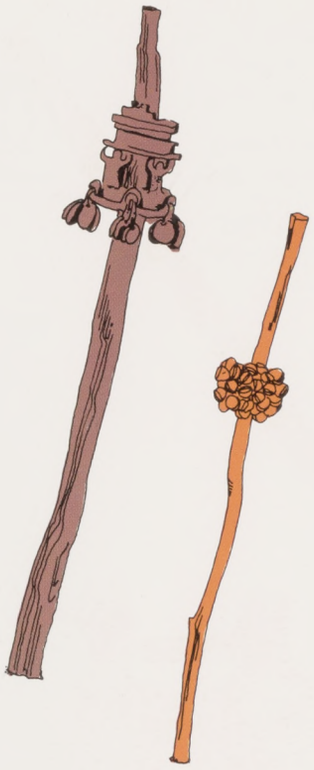
Flute of Texcatlipoca
(God of Nite)
Ceramic





Sacred slit drum
Teponaxtle
Used by Aztecs and
Mayas made of Sapote
wood from jungles of
Yacatan area
they had 8 tunings of
this kind of drum
(also made of gold)

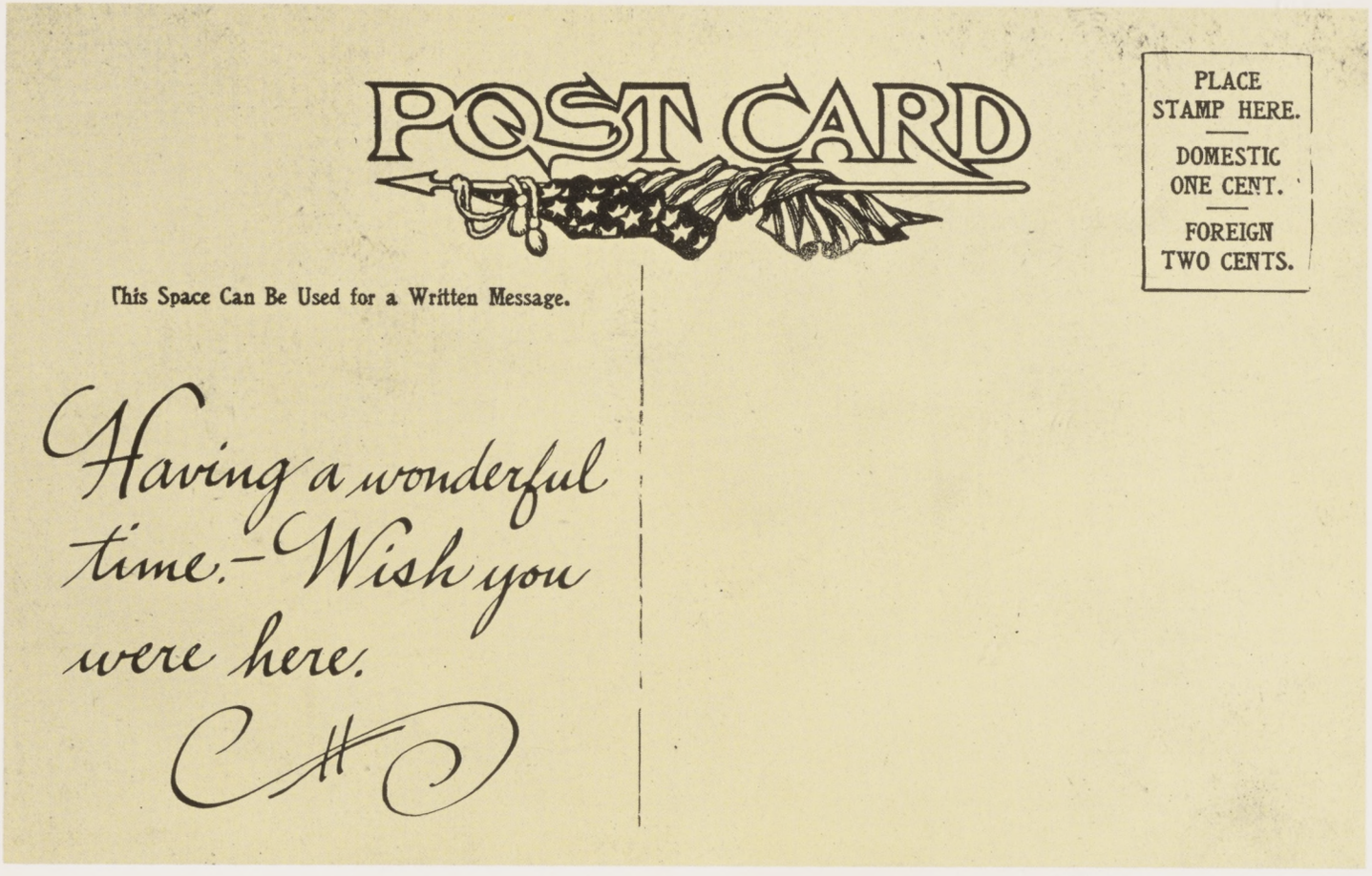
Pan pipe baked clay and
reed Nazca and Chimu
(Pre-Inca)



Silver or Fruit Shell
rattles used on
stamping tube (Inca)

Silver or copper bell
used on stamping tube
(Inca)

"Flag" series No. 710 copyrighted by Julius Bien and Co., New York in 1908 and mailed from Northwood, Iowa to Minneapolis, Minnesota in February 1910.


POST CARD
PLACE STAMP HERE.
DOMESTIC ONE CENT.
FOREIGN TWO CENTS.
This Space Can Be Used for a Written Message.
Having a wonderful time.—Wish you were here.

by **Konrad F. Schreier, Jr.**

That old familiar line on a post card, "having a wonderful time wish you were here," has been arriving in our mailboxes for many years. The souvenir picture post card has been a part of the American scene for as long as any of us can remember.

To the historical researcher the picture post card can be a valuable reference. We are reminded of the old saying, "a picture is worth 10,000 words," and the picture post card is one of the best sources of contemporary pictures to be found. In time gone by before fast mail delivery and expensive telephone calls, the post card was used even more than it is today. Post cards were, and still are, used by those who are traveling and are too hurried to write a letter. Likewise, the pictures are a wonderful reflection of the times when made.

In the Museum we have a huge collection of post cards — over 100,000 of them! The subjects of the pictures are of everything from people and places to patriotic themes and, sometimes unintentionally, comic chromos. Most of the post cards in the Museum's collection date from 1900 to 1920. The cards were collected by individuals in the same manner people collect coins, stamps, bottles and other artifacts, and then they were donated to the Museum.

In the days before color photography, the people who manufactured colored greeting cards chose the coloring they thought, or were told, was correct, and went along their merry way. The result was sometimes very unusual, especially when the cards were printed by one of the German manufacturers who did much of the color printing and lithography of cards. As a result, the researcher must be very careful to check the colors of the pictures in order to avoid a gross error.

The message on a post card can be as useful and interesting to the historian as the picture. Some of the cards in the Museum collection tell of the booms and busts of our Western mining camps. Cursory messages, written in terms only the sender and receiver could understand, are tantalizing miniature mys-

No. 1537 "American Indians-Yellow Horse," published by Edward H. Mitchell, San Francisco, California about 1910 and unmailed.

Cowgirl. Made in Germany about 1907 and mailed from Lowell, Massachusetts to New York City, New York in April 1908.

"Le Moulin Rouge"
published by Edit.
Cosson, 8, Rue Pierre
Chausson, Paris, France
about 1920 and
unmailed

teries. A form of card which intrigues many is the "stock message" variety. In the age when formal Sunday calling was the fashion, and before the wide use of the telephone, special cards were printed to be sent when one called on someone who was not at home.

Inspiration for these post cards came from many sources. The Wild West has always been the source for a lot of souvenir post cards. A trip west was, and is, an adventure for the Easterner, and post cards, sent in profusion, testify to his courage. The Indian, stern, brave and decked out in his Sunday best regalia, has always been a favorite. The fancy cowhand can be a wonder of imagination. As for the "gambling hell," well!! That has always been as big a feature of the Wild West as the frontier saloon. The clothes of the gamblers or imbibers are of considerable interest to historians of the American West — not a cowboy in view. When the old timers went to town they wore their "store-bought" clothes. The slouch hats and sloppy shirts were work clothes to be left at the ranch or mine.

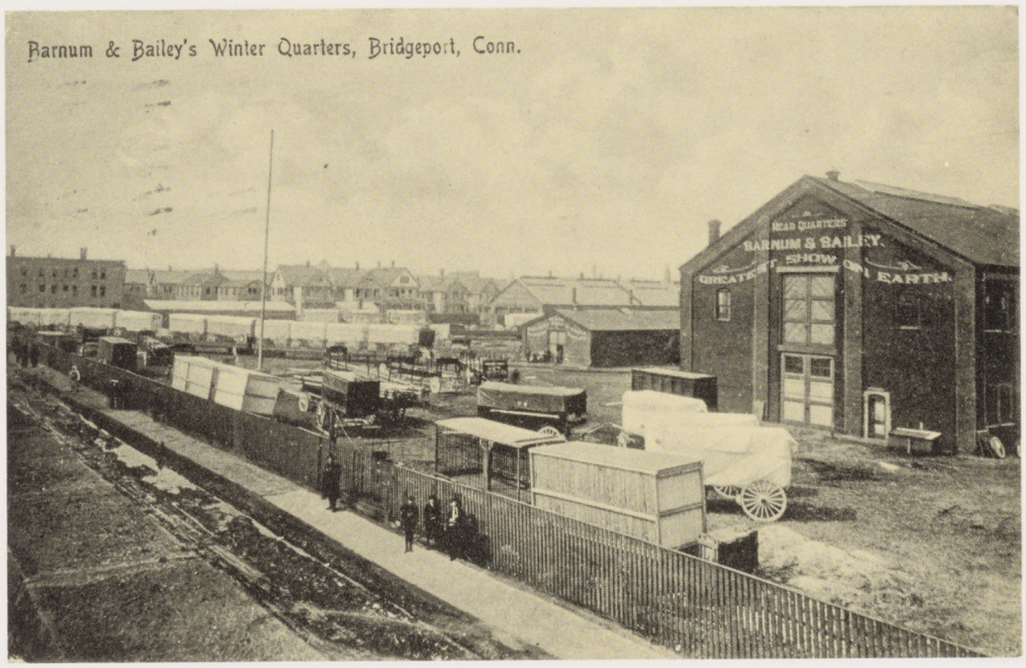
A trip to Europe has always been THE big thing in life of many Americans. There are pictures of castles, cities and the European scene in profusion in any respectable post card collection, and our Museum's collection is no exception. In a small town during the "relaxed years," word of a post card from a foreign port spread like the news of a free picnic. The famous, or infamous, "French Post Card," with its risqué picture, used to be collected like the "calendar art" of today. None of those in the Museum's collection ever saw a post office.

Entertainments are always a good subject for the picture post card. The circus, the famous night club, and the weird or spectacular "sporting event" have long been favorites. The Barnum and Bailey Circus' winter quarters have been a tourist mecca for years. The Moulin Rouge music hall in Paris is still highly popular. Bobby Leach was one of the few people who ever said something felt like going over Niagara Falls in a barrel and knew what he was talking about. Bobby sold his post card memorializing the trip to tourists, and made quite a nice income for a couple of years.

Unfortunately for the historian not many post cards show the way people worked at their places of employment. The western mining camps and the cattle raising business were colorful, and they are quite well illustrated on post cards. Means of transportation, especially boats, were and still are favorite post card subjects. It is hard to believe that the stagecoach was as important in its day as the airliner is in ours, but post cards commemorating both testify to the fact.

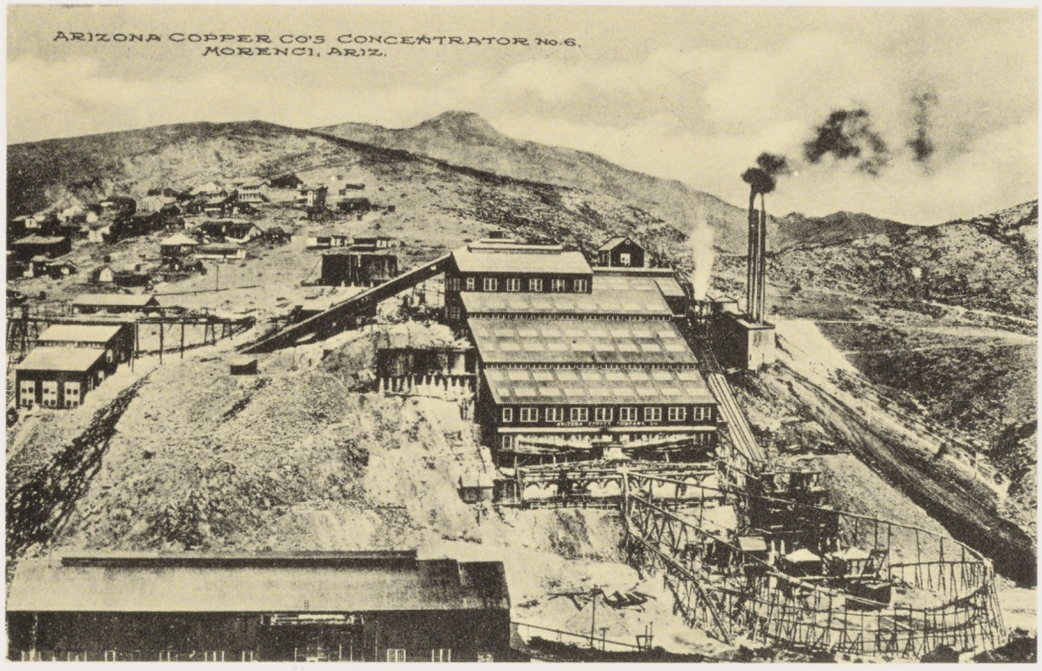
Sometimes what is written on a post card, and how it is phrased, can be the most interesting aspect of the card. The "stock message" is still with us, although it is not nearly as popular as it was at one time. Did you know that the message on a picture post card used to be placed on the picture side?

Distant places; wonderful, unusual pictures; strange, cursive messages; — all of these make up the interesting contents of the Museum's vast collection of post cards.



"Barnum & Bailey's Winter Quarters, Bridgeport, Conn.," made by SL & Co. in Germany about 1910 and mailed from Bridgeport, Connecticut to Los Angeles, California in September 1906.

This card was made for the Copper Queen Store, Douglas, Arizona by the PCK Company, Germany, and it was mailed from Douglas, Arizona to Alhambra, California in August 1907. This card is a good example of one with the message space on the picture side.

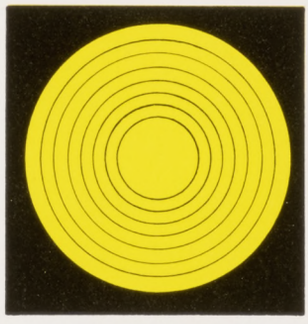


"Arizona Copper Co.'s Concentrator No. 6, Morenci, Ariz.," publisher unknown and mailed from Morenci, Arizona to Los Angeles, California in November 1908.

"Bobby Leach, and his Barrel," a photographic montage card published by Photo Specialty Co. and copyrighted in 1911 but never mailed.

A "girlie" post card made in France by P-C, Paris about 1910 and unmailed.

No. 7789 "Where All Men Are Equal," a "Phostint" card made by Detroit Publishing Co. about 1910 and unmailed.



MUSEUM SPOTLIGHT

Museum Welcomes New Staff Members

David E. Fortsch

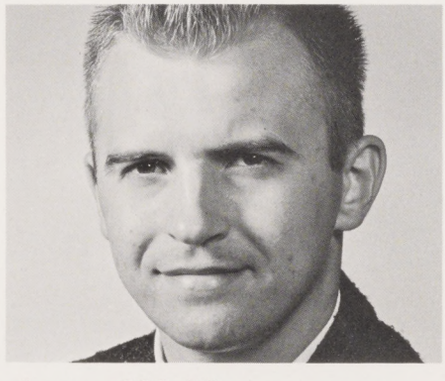
Mr. David E. Fortsch is occupying a new position in vertebrate paleontology as assistant curator in charge of the laboratory. Mr. Fortsch comes to us from the Idaho State University Museum in Pocatello. His current research interest is the cranial morphology of the Late Pleistocene Camelids and the significance of morphological characters in species determination.

Mr. Fortsch received his B.S. degree in Geology from the Idaho State University, and was employed by the Museum at Idaho State as an assistant curator in vertebrate paleontology before leaving to join the Museum staff here.

Three new preparators, specialists in Herpetology, Ichthyology and Invertebrate Zoology (Malacology), have been added recently to the Life Sciences staff of the Los Angeles County Museum of Natural History.

Gale G. Sphon

Mr. Gale G. Sphon, Jr. has joined the staff as preparator in Invertebrate Zoology. Mr. Sphon was born in California and received his A.B. degree from the University of California at Los Angeles. While taking graduate work at U.C.L.A. he joined the Los Angeles County Museum of Natural History staff as a Student Professional. In 1962 he discontinued his graduate studies to accept a position at the Santa Barbara Museum of Natural History as a specialist in Malacology. He continues at our museum in this specialty.



Jerry W. Neumann

Mr. Jerry W. Neumann is the new preparator in Ichthyology. Mr. Neumann was born in Michigan where he also attended Michigan State University, receiving his B.S. degree in Biology. He joined the museum staff temporarily in July 1967, and served a one-year internship in Ichthyology under the National Museums Act (a government sponsored program) before being appointed to his present position of preparator.

Arden H. Brame Jr.

Filling the position in Herpetology is Mr. Arden H. Brame, Jr., recently Supervisor of Los Angeles County's Eaton Canyon Nature Center. Mr. Brame, a native Californian, received his higher education at the University of Southern California where he received both his B.A. and M.S. degrees in Biology. Arden Brame's special herpetological talent lies in his wide knowledge concerning the biosystematics of salamanders.

(continued from page 2)

the Museum. Perhaps the best were the legs and parts of the body and wings of the giant carnivorous running bird, **Diatryma.** This bird stood about seven feet tall and had a massive parrot-like beaked head the size of a small modern horse. It was in the Early Eocene that the birds missed their chance. With creatures like **Diatryma** they could have taken over the world.

Most of the skeleton of a large-tusked hippopotomus-like beast, **Coryphodon,** was obtained in a trade with a local collector near Powell. This is a mountable skeleton and should make an excellent exhibit piece at some future time. The collector, Mrs. Ivan Bauer, locally known as "Wildwood Lil," lives on a ranch on the edge of the badlands and spends much of her spare time searching for fossils. She and her friend, Mrs. Tom VanWagoner, also have given us many very fine specimens for our reference collection.

Although the finding was relatively poor, the days were long, and eohippus was elusive, we did get some material for display and a nice addition to our Early Eocene study collection. Perhaps another season will be "The Year of the Fourteen Toed Horse."

Los Angeles County Museum of Natural History
Exposition Park, Los Angeles, California 90007
Address Correction Requested